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6 February 1963

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P.O. Box 1407
Washington 13, D.C.

Dear John:

This letter concerns the Image Enhancement Instrument which is currently being assembled and made ready for your acceptance. Work is coming along well on the schedule which was outlined in the 24th Monthly Progress Report. As indicated in that report, the instrument is scheduled for completion on 28 February.

It is our plan to place the completed instrument in operation several weeks prior to the February 28th date, in order that we may effect the additional testing required to assess the value of the various techniques incorporated in the design of the instrument. I recommend that acceptance of the instrument, upon its completion, be accomplished at our plant. [] would be most qualified to witness the acceptance testing inasmuch as he has been closely associated with the program for quite some time. It is our intention to have available by February 28th not only the instrument itself, in operating condition, but also a number of enhancement examples from which the performance of the instrument may be judged. At the time of acceptance, all parties concerned will be in a much better position to suggest additional testing and evaluation procedures, whether these are to be accomplished by us or by personnel in your laboratory.

As you may know, the [] is sponsoring a symposium on Image Enhancement in St. Louis on the 11th and 12th of March, 1963. I should like to make a verbal presentation at that meeting, on the subject of electronic image enhancement techniques, dwelling, in part, upon the techniques, limitations, design, and results obtained with your Instrument. An abstract of the talk is included; the talk will, of course, exclude any mention of sponsor or applications. I think the symposium will be of great

*Approved w/ approval
15 Feb 63
JWC*

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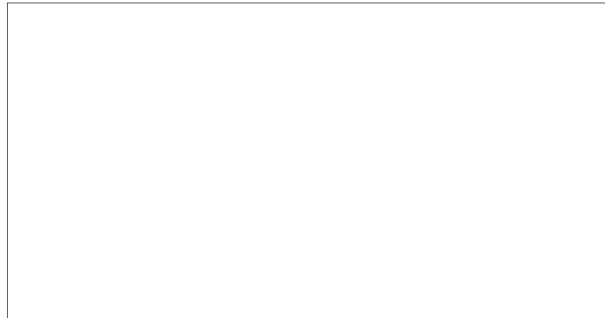
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benefit to all of us in the field, and trust that such a presentation meets with your approval.

Kindest personal regards.

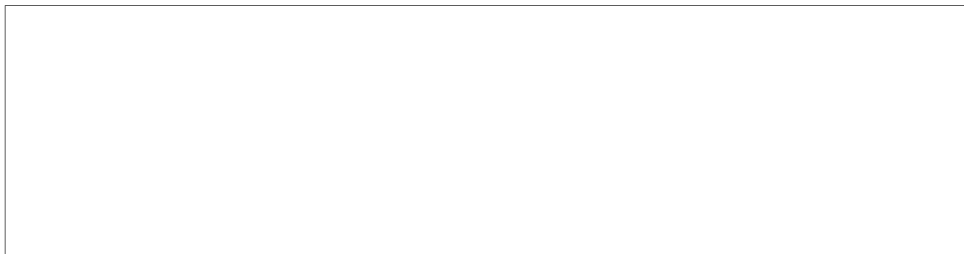
Sincerely,



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AJH:trb
Enc.

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This discussion is concerned with the class of image enhancement techniques in which the input image is scanned, and converted to an electrical signal which varies with time. The resulting signal is applied, through various electronic signal processing circuits, to a modulated light source, whose output is re-scanned over an area in a manner that re-forms the (output) image, but with a different set of brightness values for each of the picture elements. It is the objective of the system to modify the brightness values, such that the process of photographic interpretation is made easier, thus aiding the task of information extraction by the human observer. To the extent that this objective is realized, the device may be said to produce an enhancement of the input image.

The following signal processing techniques are discussed: contrast amplification, electrical frequency selective filtering, non-linear circuits for production of special effects such as gamma correction and outline drawing, automatic contrast control, and area scan (or spatial) filtering.

Discussion is provided of the application of these techniques to a working system which utilizes silver halide photographs for input material. The effects of emulsion granularity, and electrical noise impose inherent theoretical limitations upon the capability of such enhancement processes. The practical realization of a uniform high resolution scanning raster, a sensitive photoelectric detector of wide dynamic range, and flicker-free light sources for scanning and readout are among the associated engineering problems.